Section 7 – Ambient Impact Assessment

7.0 Ambient Impact Assessment

Air dispersion modeling was performed to demonstrate compliance with NAAQS for criteria pollutants and Idaho Department of Environmental Quality (IDEQ) screening levels for TAPs in support of this Pre-Permit Construction and PTC Application for the High Desert Milk facility. Modeling was performed according to the Modeling Protocol submitted to the IDEQ on June 5, 2007 (see Appendix 3 for a copy of the modeling protocol and the IDEQ approval letter).

7.1 Model Description / Justification

Air dispersion modeling was performed using the Environmental Protection Agency (EPA) AERMOD model. Building downwash was accounted for in the model. Building and tank dimensions were entered into the Building Parameter Input Program (version 04274) to calculate appropriate building profiles to import into AERMOD. Model output files are included in Appendix 4 and input/output files are included as electronic files on an enclosed compact disc.

7.2 Emission and Source Data

Eight point sources were modeled. The eight point sources included discharges from five baghouses, two boilers, and an emergency generator. Three criteria pollutants (PM-10, NOx, and CO) were modeled from these sources (emission rates for SOx and lead were below the modeling thresholds listed in Table 1 of the State of Idaho Air Quality Modeling Guidelines). The estimated emission rates for the toxic air pollutants (TAPs): arsenic, cadmium, formaldehyde, and nickel that result from the combustion of natural gas in the dryer and boilers exceeded the Emission Screening Limits (EL) and were therefore modeled. Table 7-1 summarizes the emission source characteristics used in the ambient impact analysis. All modeling was performed using the maximum potential to emit.

Modeling was performed in two passes, in the first pass we assumed 100% of the dryer emissions discharged through each baghouse stack. We found this scenario passed for all pollutants except PM10. We reran the model for PM10 with dryer emissions equally split between the two baghouse stacks. This scenario passed. For conservatism, and to save time, we did not rerun the model for the other pollutants with the emission rates split between the two stacks since the modeling worked at the higher rates.

Table 7-1
Emission Source Characteristics

Emission Source	Stack ID	Stack Height (ft)	Stack Diam. (ft)	Exhaust Temp. (^{o}F)	Stack Gas Vel. (m/s)	Emission Rates (g/s)						
						PM_{10}	NOx	CO	As	Cd	Formald-ehyde	Ni
Dryer Baghouse #1	P101A	114	4.08	190	17.08	0.665(2)	0.185	1.502	8.03E-7	4.42E-6	3.01E-4	8.43E-6
Dryer Baghouse #2	P101B	114	4.08	190	17.08	0.665(2)	0.185	1.502	8.03E-7	4.42E-6	3.01E-4	8.43E-6
Fluid-Bed Baghouse	P102	114	1.75	130	16.78	0.14	--	--	--	--	--	--
Powder Handling Baghouse #1	P103A	90	0.25 / 0.001m (1)	80	67.24 / 0.001 (1)	0.01	--	--	--	--	--	--
Powder Handling Baghouse #2	P103B	90	0.25 / 0.001m (1)	80	67.24 / 0.001 (1)	0.01	--	--	--	--	--	--
Boiler#1	P104	38	4	350	7.99	0.059	0.775	0.651	1.55E-6	8.53E-6	5.82E-4	1.63E-5
Boiler #2	P105	38	4	350	7.99	0.059	0.775	0.651	1.55E-6	8.53E-6	5.82E-4	1.63E-5
Emergency Generator	GEN	5.94	1	801	24.19	0.0252	1.01	0.542	--	--	--	--

Notes:

(1) Stack gas velocity set to 0.001 m/s and diameter set to 0.001 m for modeling purposes due to the stacks horizontal discharge orientation and vent cover.

(2) Modeling was performed in two passes, the first pass assumed 100% of the dryer emissions passed through each baghouse stack. We found this scenario passed for all pollutants except PM10. In the second pass we reran the model for PM10, with the dryer emissions equally split between the two baghouse stacks. This scenario passed. We did not rerun the pollutants at the lower rates since those pollutants passed at the higher rates (more conservative).

7.3 Receptor Network

A receptor network was established so that ambient concentrations could be evaluated. The first step in this process was to determine the location of the ambient air boundary and the second step was to assign receptor locations within the ambient air zone.

7.3.1 Ambient Air Boundary

The ambient air boundary was established as the facility's fenceline. See Figure 2 – Site Plan – Section 6, for location of the fenceline).

7.3.2 Receptors

Receptors were established to determine maximum ambient air concentrations. A receptor grid with approximately 100 meter spacing was established across the entire evaluated area. Within 300 meters of the ambient air boundary, receptors were established every 25 meters. No receptors were established within the facility's controlled property boundary (ambient air boundary).

7.4 Elevation Data

Topography data for the site was obtained from the USGS as a 7.5 minute digital elevation model (DEM). AERMAP was used to pre-process this data for use in AERMOD.

7.5 Meteorological Data

Preprocessed meteorological data (surface and upper air) from the Boise airport was provided by the IDEQ. This data was processed by IDEQ using AERMET; the output files provided by the IDEQ were used as inputs to the AERMOD model for this site. Because this input data may not be representative of actual surface characteristics or meteorological conditions at the proposed plant location, an adjustment factor of twenty percent (20%) was applied to model results prior to adding in background concentrations.

7.6 Land Use Classification

The facility is industrial while the surrounding land is a mix of open space/agricultural and industrial land uses. The Air dispersion modeling was performed using a "rural" classification.

7.7 Surface Characteristics

Surface characteristics of the meteorological monitoring station were evaluated and incorporated into the AERMET processing performed by the IDEQ. These surface characteristics may not be representative for the High Desert Milk site but a safety factor of 20 percent was applied to model results to accommodate for the difference in surface and meteorological characteristics (as discussed in Section 7.5).

7.8 Background Concentrations

Table 7-2 summarizes the criteria pollutant background concentrations. Criteria pollutant background concentrations for small town/suburban areas were provided by Kevin Schilling of the IDEQ.

7.9 Evaluation of Compliance With Standards

As discussed in Section 7.5, a model output adjustment factor of 20% was applied to the modeling results to account for variations in surface characteristics between the meteorological monitoring station and the High Desert Milk site. To determine compliance with NAAQS, the applicable background concentrations were added to the adjusted maximum predicted ambient concentrations determined from air dispersion modeling to result in total ambient concentrations. These total ambient air concentrations were compared to the NAAQS. Table 7-2 summarizes the air dispersion modeling results and compares the total predicted ambient air concentration to the applicable NAAQS. See Appendix 4 for graphical output from air dispersion modeling. Based on this evaluation, no NAAQS are predicted to be exceeded by emissions from the sources, if operated and configured as proposed in this application.

Table 7-2
Results of Ambient Impact Assessment for Criteria Pollutants
(All Concentrations in Units of $\mu g/m^3$)

Pollutant	Averaging Period	Maximum Air Dispersion Model Output	Output Adjustment Factor	Adjusted Output	Compliance Demonstration		
					Background	Total	NAAQS
PM10	24 hr, 2nd high	54.17	1.2	65	76	141	150
	Annual	16.48	1.2	20	27	47	50
NOx	Annual	45.26	1.2	55	32	87	100
CO	1hr, 2nd high	599.00	1.2	719	10,200	10,919	40,000
	8hr, 2nd high	226.71	1.2	272	3,400	3,672	10,000

7.10 Evaluation of Ambient Impact Assessment for TAPs

The maximum model output values were adjusted using a factor of 1.2 and then compared to Acceptable Ambient Concentration for Carcinogens (AACC) values for each TAP. Table 7-3 summarizes the results of air dispersion modeling performed to evaluate the ambient impact for TAPs. None of the AACC were exceeded by any of the adjusted maximum predicted ambient air concentrations; therefore, the predicted ambient impact from TAP emissions is acceptable.

Table 7-3
Results of Ambient Impact Assessment for Toxic Air Pollutants
(All Concentrations in Units of µg/m^3)

Pollutant	Averaging Period	Maximum Air Dispersion Model Output	Output Adjustment Factor	Adjusted Output	Idaho AACC
Arsenic	Annual, 1st high	7.0E-5	1.2	8.4E-5	2.3E-4
Cadmium	Annual, 1st high	3.8E-4	1.2	4.6E-4	5.6E-4
Formaldehyde	Annual, 1st high	2.6E-2	1.2	3.1E-2	7.7E-2
Nickel	Annual, 1st high	7.2E-4	1.2	8.6E-4	4.2E-3